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Financial resources and mechanisms

Addendum

Report of the Secretary-General

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INTRODUCTION

1. The present addendum aims to support the analysis of issues and the presentation of policy options outlined in the report of the Secretary-General on financial resources and mechanisms (E/CN.17/1996/4).

2. The report focuses on the mobilization of external and national resources for the financing of sustainable development. In addition, it discusses innovative international financial mechanisms and mechanisms for the financing of sectors and cross-sectoral issues (technology transfer, atmosphere and oceans). Section V focuses on refining the format and content of a matrix of policy options and financial instruments.

I. MOBILIZING EXTERNAL FINANCIAL RESOURCES FOR SUSTAINABLE DEVELOPMENT

3. This discussion of current developments in resource flows and debt is based on the most recent report of the Development Assistance Committee (DAC) of the Organisation for Economic Cooperation and Development (OECD). 1/ Useful information was also obtained from the report of the Secretary-General on the sources of finance for development at mid-decade and the developing country debt situation as of mid-1995 (see A/50/397 and A/50/379). 2/

A. External conditions and financial flows

1. Recent developments in external conditions

4. In most of the industrial countries, economic expansion has been under way for some time, although the pace of economic expansion slowed somewhat in the first half of 1995. Among the countries where the upswing has been the strongest - the United States of America, Canada, the United Kingdom of Great Britain and Northern Ireland, and Australia - some moderation of growth was appropriate following the rapid absorption of slack during 1994. For Germany, France and several other continental European countries still recovering from the 1992-1993 recession, economic activity is expected to remain relatively strong. The most serious deterioration in the economic situation has occurred in Japan, which is experiencing one of its most serious economic slow-downs in the post-war period.

5. Among most of the developing countries, growth has remained strong and should average about 6 per cent in both 1995 and 1996. Conditions for a pick-up in growth are also improving in many of the poorest countries. In Africa, however, many countries are still suffering from declining or stagnating levels of per capita income: significantly higher growth rates will be required to improve living standards.

6. Economic growth varies considerably across the countries in transition. For example, in the Russian Federation, Belarus, Ukraine and most Transcaucasian and central Asian countries, growth continued to decline in 1994 and the first

half of 1995. In contrast, such countries as Poland, the Czech Republic, Slovakia, Hungary, Slovenia, Albania, the Baltic countries and Mongolia are enjoying robust economic growth.

7. The substantial reversal in 1995 of earlier rises in long-term interest rates is expected to provide significant support to economic growth in the period ahead. However, barring stronger efforts to reduce fiscal deficits than currently envisaged, only a few countries appear to have significant scope for further lowering interest rates.

8. The expansion of the volume of world trade in goods and services is expected to record a pace of 8 per cent in 1995 and 6 1/2 per cent in 1996. Out-sourcing from industrial countries with strong exchange rates, increased trade among the developing countries and the continued recovery of trade in economies in transition are the main factors that will contribute to rapid trade growth.

9. Prices of internationally traded goods (measured in special drawing rights (SDRs)) are expected to change only marginally over the short term, as productivity increases, trade is further liberalized and competitive forces (including in commodity markets) contribute to keep global inflationary pressures at bay.

2. Current trends in resource flows and debt

10. Table 1 provides an overview of recent trends and patterns in the financing of sustainable development, based on the DAC statistical reporting system.

11. Four major trends are noteworthy. First, total net resource flows to developing countries rose again in 1994, reaching $185 billion. Second, a further increase in foreign-direct investment and a resurgence of international bank lending were the predominant forces. Third, bond lending levelled off a little below the unusually high levels reached in 1993. Fourth, disbursements of official development finance (ODF) fell: concessional disbursements of official development assistance (ODA) rose in both nominal and real terms, but multilateral net lending on non-concessional terms dropped substantially and bilateral net lending on non-concessional terms rose only slightly.

12. After a sharp fall in 1993, total ODA reached $59 billion in 1994, up by $3 billion from the previous year and steady in real terms. For 13 DAC member countries, the real level of aid disbursements increased, while for eight of them disbursements fell (see table 2). Total ODA of DAC members as a percentage of their combined gross national product (GNP) dropped from 0.31 per cent (revised figure) to 0.30 per cent, the lowest level since 1973.

13. As to the allocation of ODA for environmental targets, DAC members have actively worked towards finding adequate policy responses to implementing the Agenda 21 objectives agreed at the United Nations Conference on Environment and Development. It is now clear that significant external funding for environmental projects and programmes has been forthcoming: in 1993 about 5 per cent of new ODA commitments were reported as being specifically for

environmental purposes. However, environment is only one intrinsically linked element of sustainable development, the other components being social and economic. At present, available definitions do not permit a global assessment of the domestic and external resources that have been allocated to sustainable development categories as used in Agenda 21. For some observers, this is a significant factor hampering the implementation of Agenda 21. DAC will continue its collaboration with the Commission on Sustainable Development in further efforts to improve the adequacy of statistical data in this field.

14. Closely related to the issue of financial flows to developing countries is the scale and pattern of developing country debt. Table 3 shows that in 1994, stocks of developing country debt grew by some $144 billion to $1,714 billion, of which about a quarter is short-term debt that rose by about 14 per cent in United States dollar terms ($52 billion). Long-term debt rose by 7 per cent, or nearly $85 billion.

B. Select policy issues

1. Taking a new approach to sustainable development financing and ODA

15. There is a growing recognition that it will be necessary to develop a new approach to the financing of sustainable development in view of the changing balance between private capital flows and ODA, remaining debt problems and domestic development strategies that affect the financing of sustainable development.

16. In developing a new approach, a number of key issues need to be addressed, such as whether rising domestic savings and tax revenues should be at the heart of a sustainable development process, and whether aid dependence should decrease over time. 3/ Furthermore, ways and means of increasing the effectiveness of bilateral and multilateral aid need to be discussed. Considering that the capacity and integrity of the domestic financial sector determines the extent to which economies are able to interface with international capital markets, it will be necessary to review policies that are geared to nurturing the development of the domestic financial infrastructure. Moreover, it will be essential to discuss the relationship between the debt profile of developing countries and their ability to mobilize additional financial resources for sustainable development.

17. In view of the unprecedented requirements for the financing of infrastructure it will also be desirable to develop new financial mechanisms, particularly for meshing together public and private financial resources, within the framework of a new approach to sustainable development financing. In addition, the important issue of the sustainability and stability of large global financial market-intermediated resource flows needs to be addressed with an emphasis on promoting a larger officially provided safety net and intensified surveillance by international organizations.

18. In developing a new vision for the financing of sustainable development, it will also be necessary to arrive at a differentiation between countries that

goes beyond simple regional categories or broad income categories in order to capture the reality of a changing world. Indeed, in view of the strong trend away from State-led development towards market-based economic strategies, the development of a new approach to the financing of sustainable development will become an integrated part of policy reform efforts.

2. Addressing remaining debt challenges

19. Debt problems are far from over for a significant number of countries, most of them severely indebted low income countries (SILICs). With very few exceptions, these are countries whose debt-servicing performance is far below contractual obligations, with no realistic hope at present debt levels of ever achieving normal servicing of debt. By far the largest component of the debt of such countries consists of official or officially supported claims. The Paris Club Naples terms open the way for definitive reductions in the stocks of official bilateral debt. In a significant number of cases, however, a large proportion of the debt stock is multilateral. Definitive Paris Club action on bilateral official debt can contribute to improving the capacity to service multilateral debt, but it is unlikely to resolve by itself the debt problems of countries with high proportions of multilateral debt.

20. Ways will have to be found both to implement the Naples terms on a more comprehensive basis (for example, considerable amounts of bilateral debt are not eligible under the cut-off dates established) and to find additional ways to finance multilateral debt service.

21. The future ability of developing countries to attract private flows and avoid disruptive episodes of private-market financing of development will be strongly influenced by their debt profiles. In a financial climate in which excessive debt-servicing payments are financed by high levels of new aid, it is difficult to see how countries can develop healthy public financing structures and strong financial intermediation systems for private-sector development. Their credit ratings are also bound to remain low, postponing well into the future their prospects for attracting external private-market finance. In this context, the continuing development of a debt strategy, including some consideration of whether there is a case for a new facility to cope with the overhang of multilateral debt, remains especially important.

II. MOBILIZING NATIONAL FINANCIAL RESOURCES FOR SUSTAINABLE DEVELOPMENT

A. Increasing the role of the private sector in the financing of sustainable development

22. As a follow-up to the discussion by the Commission at its third session, section II.A addresses various obstacles to the private-sector financing of sustainable development and to policies that could remove such obstacles, in particular improved access to credit, financial incentives, and innovative mechanisms, such as co-financing arrangements and venture capital funds (see E/CN.17/1995/8).

1. Obstacles to increased private-sector financing

23. In order to increase the role of the private sector in the financing of sustainable development a number of specific hurdles will have to be overcome. For example, risk is a prime consideration in the decisions of private investors. Firms that are contemplating environmental investments face market risks and risks resulting from changes in licensing, taxation, the levying of tariffs, exchange-rate policies and access to foreign exchange. In addition, firms cannot be sure that Governments will enforce regulations and not arbitrarily change them (policy credibility risk).

24. Furthermore, firms often lack access to information about new technologies, and do not necessarily consider cleaner production through a more efficient use of raw materials as a sufficient incentive to invest. In particular, in developing countries the so-called stamp of environmentally friendly production is typically not available, partly because environmental goals have a lower priority than they have in some developed countries, in which the stamp provides marketing advantages.

25. In general, firms in developing countries limit their investment to compliance investments, i.e., investment geared to environment regulation. Even in developed countries, the bulk of investment is compliance investment. Voluntary, non-compliance investment, such as investing in environmental controls over and above required compliance, does not play a major role.

26. Non-compliance investment is undertaken for a variety of reasons. In addition to expanding market share through an improved environmental image for so-called "green consumers", the cost-reduction motive plays a major role. Cost reduction can be achieved, for example, through recycling, the source reduction of waste and the conservation of energy and materials. Non-compliance investment is also undertaken in anticipation of regulations that are not yet in existence or are planned (anticipatory compliance).

2. Implementing enabling policies

27. A sound policy framework that embraces economic, resource and environmental issues sets the incentive structure for the private sector. For instance, environmental policies concerned with preserving habitat or reducing levels of pollution emissions provide negative incentives in the form of regulations, taxes, charges, tradeable permits and penalties for non-compliance. The effectiveness of negative incentives will depend on the administrative capabilities of government institutions and the attitudes of the general public towards environmental issues. In developed countries, negative incentives have worked well and helped to ensure that a substantial share of environmental investment is financed by the private sector.

28. The effectiveness of environmental and resource policy in boosting private-sector finance can be substantially increased by the provision of positive incentives to the private sector. There is a broad range of such incentives, which can be divided into financial incentives, incentives for creating or changing markets and incentives for reducing market risk. In addition, private-

sector finance for sustainable development can be promoted by institution-building and campaigns for changing consumption and production patterns.

29. Tax incentives and ways and means of increasing access to credit for private-sector investment in sustainable development were discussed by the Commission at its third session (see E/CN.17/1995/8), and initiatives for changing consumption and production patterns are also discussed in the report of the Secretary-General on changing consumption and production patterns (E/CN.17/1996/5 and addendum).

30. In addition to discussing how Governments can implement enabling policies for increased private sector financing, it may be useful to also address what international organizations could do in this regard.

3. International organizations and private-sector financing

31. International organizations plan to continue making a significant contribution to promoting private-sector financing in sustainable development in the areas of forests, energy, new and renewable sources of energy, ozone-depleting substances, biodiversity and greenhouse gas mitigation. Projects are designed to create or change markets, reduce market risks or finance global benefits, such as the phasing-out of ozone-depleting substances.

32. One of the most direct ways to lever private-sector finance is to privatize services. For example, until the early 1990s Buenos Aires suffered from a water supply and sanitation system that was badly maintained and overstaffed. With the advice and assistance of the World Bank, a privatization programme was started in 1991, involving a bidding for a concession, whereby a private operator would undertake to operate, maintain and expand the water and sanitation services over a 30-year period, with the assets to remain publicly owned. Part of the finance was provided by the World Bank and the Inter-American Development Bank.

B. Evaluating the performance of economic instruments

33. At its third session, the Commission assessed the role of economic instruments in sustainable development policies discussed how to achieve a better mix between economic instruments and command-and-control measures, and identified and analysed major obstacles to the introduction of economic instruments in different groups of countries. The discussion was supported by a wide range of examples of the use of economic instruments in developed countries, developing countries and economies in transition (see also E/CN.17/ISWG.II/1994, E/CN.17/1995/8 and E/CN.17/1995/13).

34. In order to illustrate some new developments in the use of economic instruments, some examples are provided below (see also E/CN.17/1996/5 and addendum). In view of the interest of the Commission in advancing the policy dialogue on economic instruments, this will be followed by a preliminary evaluation of the functioning major economic instruments that are currently in

practice, in particular pollution taxes, natural resource taxes, emission trading schemes and subsidies.

35. In OECD countries, much of the current interest in applying economic instruments to environmental objectives centres on opportunities for gradually "greening" the tax system. This can occur in several ways, such as by imposing new or modified eco-taxes, reforming the tax regime along environmental lines, or reducing economic subsidies that harm the environment; OECD countries are active in each of these areas.

36. In OECD countries, environmental considerations are playing an increasing role in the design of several taxes. The continuing growth in the use of product charges/taxes aimed at correcting externalities is reflected in recent developments in Belgium, Denmark and the United Kingdom. Furthermore, energy taxation has been reformed in a number of OECD countries; such reforms have included the transport sector, particularly vehicles, sometimes with explicit provisions for the benefit of the environment.

37. Only a few OECD countries, however, are currently considering a restructuring of their existing tax system in order to make it more environmentally friendly while keeping the total fiscal burden constant. But a number of countries (Norway, Sweden and the Netherlands) have established study groups to look at ways of arriving at a more environmentally friendly tax system.

38. Economies in transition and developing countries are continuing to show an interest in the use of various types of economic instruments. For example, a number of countries have introduced pollution taxes. Russia, Hungary, Poland and Estonia all impose taxes on air and water emissions that take into account factors influencing the level of environmental damage, such as the quantity and toxicity of emissions. Several developing countries impose levies on air emission (China, India and Korea) and on water emissions (China, Korea, Malaysia, the Philippines and Thailand).

39. To date, the economies in transition and developing countries have been slow in following the example of OECD countries in introducing indirect environmental taxes (taxes on productive inputs or consumer goods whose use is related to environmental damage). Among the exceptions is Bangladesh, which has introduced taxes on ozone-depleting substances.

40. The major obstacles that generally obstruct environmentally oriented tax reforms were discussed by the Commission at its third session (see E/CN.17/1995/8).

1. Pollution taxes, natural resource taxation and emission trading schemes

41. In view of the continued interest of countries in increasing the use of economic instruments (EIs), there is an equally strong interest in evaluating the practical achievements of such instruments in terms of their environmental effectiveness and economic efficiency. EIs are expected to achieve a level of

environmental protection similar to existing command-and-control instruments at a lower cost (cost effectiveness); induce more innovation in pollution-abatement technologies than traditional command-and-control instruments (thus achieving a higher level of abatement); and generate government revenues that can be used for reducing non-environmental taxes or increasing government spending for sustainable development (in the case of taxes, charges and auctioned permits).

42. Unfortunately, there is far too little evidence available on the practical achievements of economic instruments once they have been implemented (ex post evaluation), so that no definitive answer can be given to the question of whether they really live up to the expectations outlined above. OECD is trying to address this problem, and has launched a project on the evaluation of EIs. In addition, other institutions, such as the International Monetary Fund, and academic researchers have made valuable efforts in evaluating the practical use of EIs.

43. From the work of various institutions and researchers, some interesting policy conclusions can be drawn about pollution taxes, natural resource taxation and pricing, and emission trading schemes, which are discussed below. It is important, however, to note that the evaluation carried out so far has not been systematic and has faced significant conceptual difficulties.

(a) Pollution taxes

44. According to economic theory, taxes that are levied on environmentally polluting emissions to internalize the social costs of pollution (Pigouvian taxes) are the most efficient means of addressing pollution-induced environmental degradation. Taxes that are levied on factors of production or products (indirect environment taxes) are a second-best alternative to pollution taxes and can be as efficient at mitigating pollution-induced environmental degradation under very specific circumstances.

45. Pollution taxes that have been implemented to date have been criticized on several grounds. For example, it is often noted that the rates of such taxes are set too low to efficiently mitigate pollution-induced environmental degradation: they are set so low that the cost of paying the tax is often less than the cost of abatement. In addition, existing pollution taxes have been ineffective in encouraging State-owned enterprises to abate pollution, which is certainly borne out by the experience of China and countries in Eastern Europe.

46. In addition, there is often a confusion of purpose for pollution and other environment taxes. Often an environmental rationale has been used to justify the introduction of a tax. In practice, few environment taxes have the purpose of internalizing the social costs associated with pollution-induced environmental degradation. For example, some environment taxes are implemented as user charges to offset the cost of effluent treatment by firms; others function as fines for emissions beyond a quantitative target level; and others function as earmarked taxes raising revenue for extrabudgetary environmental funds.

47. Experience has shown that even when pollution taxes (charges) are introduced as revenue-raising mechanisms, there can be an incentive role as a

by-product. There is also a possibility that a system that was initially designed for revenue raising can eventually evolve into an incentive system. This has been demonstrated, for example, by the system of water pollution charges in the Netherlands. On the other hand, there have been instances in which incentives have been introduced from the outset, leading to substantial reductions in emissions (nitrous oxide) and sulphur taxes in Sweden.

(b) Natural resource taxation

48. Governments use several fiscal instruments to capture rents from natural resource extraction and harvesting, reflecting their role as sovereign tax powers and owners of natural resources. As owners of natural resources, Governments must determine when to exploit their natural resources and ensure that they get an appropriate price for its resources. There are various types of prices charged for the use or exploitation of government-owned natural resources, the most common being royalties, lease bonuses and licence fees.

49. Underpricing of government-owned natural resources occurs when Governments do not ensure that natural resources are adequately priced, or when private firms do not face the costs of environmental degradation caused by extracting or harvesting natural resources. Therefore, underpricing is a policy failure that can lead to excessive exploitation and harvesting of natural resources and rent-seeking behaviour. Such rents are the difference between the price of the resource and the cost of extracting the resource (including a profit margin and perhaps a risk premium). A key policy objective is to design a fiscal regime that will allow the Government to adequately capture such rents.

50. In practice, the ongoing reform of natural resource fiscal regimes in various countries has a long way to go in mobilizing substantial additional budgetary resources and at the same time discouraging excessive extraction and harvesting of natural resources. Forests are a good example of the difficulties of adequate natural resource pricing and successful capturing of rents. In many countries, forest resources have been underpriced for a variety of reasons. For example, timber royalties are set too low, or the real value of a specific rate of royalties has been eroded by inflation. In addition, in some countries fiscal regimes for the forestry sector have been excessively complex, with a multitude of charges and fees, or Governments do not have the capacity to adequately enforce existing fiscal regimes. Empirical studies undertaken to measure the capture of rents accruing to the harvest of forest resources show great divergencies between countries.

51. Another good example of the difficulties of resource pricing is mineral resources. Studies have shown that many countries in Asia manage to capture over 80 per cent of the rent accruing to the extraction of mineral resources, partly because of clear property rights. However, this may be changing as countries lower their rent capture in response to international competition for new mining investments and declining international commodity prices.

(c) Emission trading schemes

52. The emission trading programme for air pollution, which was introduced in the United States during the 1970s and subsequently amended since that period,

covers all significant stationary sources of pollution for five principal air pollutants (hydrocarbons, oxides of nitrogen, particulate matter, sulphur oxides and carbon monoxide). Different emission trading options or programmes are available, depending on the type of pollution source, including netting (introduced in 1974) and offsets (established in 1976).

53. The control cost savings vary widely among the programmes. Netting has resulted in the greatest cost saving, estimated at between US$ 525 million to US$ 12 billion. The cost savings for offsets are estimated to be in the order of hundreds of millions of dollars. Most estimates place the accumulated capital savings for all components of the programme at over US$ 10 billion. It is, however, extremely difficult to determine exactly how much of the improvements in air quality can be attributed to the emissions trading programme.

2. Subsidies

54. In the context of rising public sector deficits and debt, more and more questions are raised concerning the distortionary effect of many existing subsidy schemes in OECD countries and elsewhere. It is argued that Governments have encouraged unsustainable behaviour by providing subsidies or tax incentives, and it has been emphasized that the reform of such schemes could achieve a more efficient allocation of economic resources that will generate environmental benefits.

55. However, the situation is not likely to be as simple as this in actual practice. Indeed, subsidies may generate either positive or negative environmental effects, as well as positive or negative economic effects. For example, subsidies to agricultural producers may result in more land being used for agriculture than would otherwise be the case, which may restrict other land uses, especially for forestry and wetlands, both of which often have significant environmental values. On the positive side, public assistance to rail, combined transport and public transport infrastructure may be helping to reduce pollution loads by shifting modal choices away from road transport.

56. Subsidies may also generate either positive or negative economic effects. For example, they may shift the burden of payment for pollution away from the actual source of that pollution (violation of the polluter pays principle), thereby distorting resource allocations. On the other hand, they may also reward and thereby help and promote the creation of new public goods, such as environmental improvements.

57. In addition, the distributive consequences of subsidies need to be considered. For example, reducing existing subsidies would probably have negative financial effects on those who currently receive them, but their economic and environmental implications may be quite different.

58. The net effects of subsidies will consequently be an empirical question. Again, the net effects of reforming subsidy programmes will not automatically result in improvements for either the environment or the economy. The actual

effects of any reductions will depend on the context in which the subsidies were granted in the first place and on the specific way in which they are reduced.

59. Unfortunately, empirical information about the level of existing subsidies is scarce, information about their impact on the economy is even more difficult to obtain, and determining their impact on the environment is extremely difficult.

60. It will therefore be pragmatic to first give a brief overview and rough evaluation of existing subsidy regimes and the rationale behind them, outline what would be required to make an assessment of subsidies that would be sound enough to serve as a basis for policy reforms, and briefly discuss current initiatives in this regard.

(a) Major characteristics of existing subsidy regimes

61. The volume of current subsidies is impressive. For example, cash subsidies to businesses for the period 1975 to 1990 averaged 2.5 per cent of GDP for all countries. Moreover, total subsidies and transfers from central Governments for the period 1975 to 1990 accounted for approximately 11 per cent of GDP for all countries. As a share of total central government expenditures and net lending for the same period, subsidies and transfers accounted for approximately 32 per cent for all countries.

62. Sectoral studies on subsidies in the areas of energy, transport, agriculture and water management provide a more concrete illustration of current subsidization practices. For example, for energy it has been estimated in the past that, excluding electricity subsidization, subsidies for fossil fuels are in excess of US$ 210 billion (approximately 50 per cent of this amount for petroleum products, 33 per cent for natural gas, and 17 per cent for coal). These subsidies account for 20 to 25 per cent of the value of fossil fuel consumption at world prices. In the transport sector, OECD countries have heavily subsidized road transportation. It has been estimated that in the United States, road transport pays for only 79 per cent of its total costs through taxes and tolls paid by road users, the remaining costs being borne by the Government in what amounts to a direct subsidy to road transport. It is also argued that the cost of accidents, noise, air pollution, congestion and climate change (external costs of transport) must be treated as transport subsidies. Unfortunately, transport studies on developing countries are lacking, mainly because insufficient data is available.

63. OECD countries subsidize agriculture by a variety of policies, ranging from domestic support measures and supply controls to trade and rural adjustment measures. OECD calculates total agricultural subsidies in OECD countries at US$ 350 billion in 1994, equal to 1.8 per cent of GDP, or nearly US$ 400 per capita. Studies of developing countries in Asia, Latin America and Africa found high effective subsidy rates. Irrigation subsidies exist in both developed and developing countries. For example, it is estimated that irrigation subsidies in the United States amount to approximately US$ 1 billion annually. In developing countries, cost recovery of water services is estimated at approximately 35 per cent. Cost recovery for irrigation is also low, and is estimated at 25 per cent.

(b) Attempts to assess subsidy regimes

64. Various attempts have been made to analyse the economic and environmental efficiency of subsidies in the areas of energy, transport, agriculture and water management in a systematic way. For example, in the area of energy it has been estimated that the removal of fossil fuel subsidies would reduce carbon emissions by 7 per cent. Other researchers have calculated that the removal of all energy subsidies in non-OECD countries could reduce carbon dioxide emissions by 20 per cent in the case of instantaneous subsidy reduction. Over a 20-year time period, the reduction would be 10 per cent, which is equivalent to 7 per cent of global emissions.

65. Transport studies in the United States have estimated that a subsidy removal by charging user fees or gasoline taxes would reduce carbon dioxide emissions by 10 to 15 per cent in a 20-year period and that a mix of targeted policies (tax, regulation and information) is likely to be most effective.

66. Economic and environmental benefits from the removal of agricultural subsidies have been estimated for several countries. For example, World Bank studies have illustrated how agricultural subsidies contributed to the underpricing of environmental resources, resulting in land degradation and pollution. Furthermore, subsidizing water prices to keep the price of water low for the poor has not worked well in practice. Prices of water bought by the poor (vended water) tend to be much higher than piped city water (as much as 12 times higher).

67. Attempts to assess the economic and environmental efficiency of existing subsidies have succeeded in giving some idea about the magnitude of total subsidies. Furthermore, past and current assessments have indicated to what extent subsidies in various sectors have failed to reach their original purpose and/or are no longer justifiable on efficiency or equity grounds.

(c) Improving the assessment of subsidy regimes

68. Due to tight budgets in developed countries, developing countries and economies in transition, policy makers are showing increasing interest in saving on scarce budgetary resources by launching reviews of existing subsidy regimes. They hope that subsidy reforms will at the same time realign the incentive structure in favour of environmentally sound practices, remove economic distortions that hinder efficiency and economic growth, and lead to a more equal income distribution by curtailing the benefits of subsidies to the rich.

69. In addition to national efforts, developed countries have taken steps in the international arena. The environment ministers of the G-7 countries at a meeting in Hamilton, Canada in May 1995, requested that OECD review subsidies to promote sound environmental practices in OECD countries.

70. Subsidies may generate positive or negative economic and environmental effects, and the assessment of the net effect is an empirical question. However, for too long not enough attention has been paid to discerning the beneficial from the distortionary subsidies. Confronting the results of

existing subsidy regimes with policy objectives will facilitate policy evaluation and may initiate policy reforms.

71. In order to discern the beneficial from the distortionary subsidies, it will be necessary to undertake systematic assessments of subsidy regimes. For assessments to be more systematical, it will be important to (a) arrive at a clearer definition of subsidies, (b) develop more suitable indicators for measuring the magnitude of subsidies and (c) improve on the impact assessment of subsidies.

72. In response to the request of the G-7 environment ministers, OECD is currently developing a two-year project to assess the value and magnitude of subsidies, develop a conceptual framework for evaluating the repercussions of subsidies on the environment, and develop policy recommendations on the desirability of the removal of certain subsidies and the implementation of such a policy.

73. In addition, the Earth Council has embarked on a project to study economic incentives for sustainable development, with an emphasis on subsidies. The Council intends to make a significant contribution to the analysis of subsidies and come forward with policy proposals for an international effort to reduce environmentally damaging subsidies.

C. Strengthening the revenue base of national environmental funds

74. At its third session, the Commission addressed the usefulness of national environmental funds (NEFs) in various groups of countries and its discussion was supported by a brief analysis (see E/CN.17/1995/8). The Commission felt that it was important to explore ways and means of strengthening the revenue base of NEFs from external resources. The following discussion will concentrate on this issue.

75. External resources may be channelled through NEFs in the form of grants or concessional (soft) loans from bilateral donors, or market-rate loans from international financial institutions (IFIs) or international commercial banks. Bilateral donors may find that using the NEFs as intermediaries for financing environmental investments can provide a number of advantages. For example, NEFs have often accumulated expertise in identifying promising environmental projects. In addition, some bilateral donors and IFIs may face problems finding local counterpart funding, and NEFs can provide resources for co-financing. NEFs may also be better able to undertake innovative financing arrangements than government ministries. 4/

76. Various obstacles to using NEFs as an intermediary for donor assistance have been identified. 5/ Key areas of concern are that NEFs (a) may not address wider social and economic issues; (b) do not manage to sufficiently integrate local communities in the decision-making process; and (c) do not provide the legal and financial safeguards that donors require. Other important areas of concern are that NEFs may not be well equipped to offer donors the visibility they require and incur rather high administrative costs.

77. It appears that some of these concerns are exaggerated or can be overcome. For example, as far as the issue of a lack of concern for general development objectives is concerned, it is evident that many NEFs do go beyond immediate environmental concerns to address the social and economic causes of environmental problems. Furthermore, NEFs in the Philippines, Colombia and Uganda have demonstrated that participation of local communities in the decision-making process can be ensured. Moreover, experience has shown that legal safeguards for donors can be ensured through the use of revocability clauses and checks and balances in the management and voting procedures of NEFs.

78. It is evident that for donors, NEFs are not a substitute for delivering development aid directly. NEFs are a tool that donors can call upon when approaching the problems of any particular country; it is important that over the coming years efforts be made to further develop that tool.

III. FEASIBILITY OF INNOVATIVE MECHANISMS FOR FINANCING THE PROTECTION OF THE GLOBAL ENVIRONMENT

79. While such mechanisms as international environmental agreements and the Global Environment Facility (GEF) can make a significant contribution to mitigating global environmental problems, recent discussions in the Commission and other international forums have focused on additional mechanisms in the form of global taxes and user charges for financing global environmental efforts. Examples include an internationally agreed tax on air transport, the Tobin tax and a global carbon tax (a number of European countries have introduced national carbon taxes). It is argued that such innovative mechanisms should be pursued in parallel with efforts to increase ODA as a percentage of GNP, replenish the GEF in a substantial way and encourage private-sector investment in sustainable development.

80. Advocates of such taxes and charges tend to assume that they would easily become widely accepted by national Governments, and have thus chosen to focus on technical details. Unfortunately, this may not be a realistic approach because global taxes and charges, even if technically feasible, may not be readily accepted. It seems that there is currently little willingness on the part of many Governments to cede sovereign taxation power to any international body. In addition, global taxes would probably result in enormous wealth transfers, depending on the design of individual taxes, which by itself will make the negotiation of global taxes extremely difficult.

A. Internationally agreed tax on air transport

81. Some work on substantive and technical aspects of an internationally agreed tax on air transport (IATT) (see E/CN.17/1995/8), has been undertaken since the third session of the Commission, in particular on identifying an appropriate tax base; estimating the revenue potential of the tax; and examining the likely effect of the tax on emissions and its contribution to reducing ozone depletion and greenhouse gases. It will, however, be necessary to arrive at more concrete results.

82. If the IATT were tied to the turnover of airlines, it could not be expected to be successful in internalizing the cost of pollution because the turnover of air transport is not closely linked to emissions: there is no proof that air transport turnover is directly related to greenhouse gas emissions or ozone depletion.

83. Air distance travelled, aircraft fuel consumption and average age of airplanes may be more direct proxies for the level of emissions. Ideally, the tax should be designed in such a way that it would contribute to reducing the average age of airline fleets and encourage the adoption of cleaner engine technologies.

84. Based on the total air distance travelled (passengers and freight) of 270 billion kilometres in 1994 and a per unit tax of US$ 0.004 per kilometre, some US$ 1 billion per annum would be raised.

B. Tobin tax

85. The Tobin tax has attracted much attention lately, both in terms of policy dialogue and research. For example, the Office of Development Studies of the United Nations Development Programme organized a seminar on the subject in 1995. In the same year, the United Nations Conference on Trade and Development issued a discussion paper on the case for the Tobin tax. 6/

86. Although the Tobin tax is effectively a financial excise tax, it is discussed more for its revenue potential than its relation to the global environment, which is understandable in view of its huge revenue potential: given that the daily turnover in foreign-exchange conversion is estimated at about US$ 1.2 trillion, a Tobin tax of 0.01 per cent on the value of each transaction would yield some US$ 30 billion a year (based on 250 business days per year).

87. Critics have argued that the Tobin tax as it was originally conceived would not be viable because it does not permit discrimination between speculative flows and normal liquidity required in trading. Moreover, the high substitutability of financial products would render the taxation of spot transactions in foreign-exchange conversion ineffective against speculative activities. In addition, when reasons exist for expectations against a prevailing foreign-exchange rate, speculative activities in foreign-exchange markets would not be entirely eliminated because gains from speculation could easily exceed the revenues from a low-rate Tobin tax.

88. While new variations of the Tobin tax have been suggested in the course of time, five criticisms of the economic and environmental justification of the tax have been made. First, like all taxes it would introduce an efficiency cost. Second, its distributional impact would be complex and could not be predicted with any certainty. Third, its focus on reducing exchange-rate volatility would be tantamount to treating the symptoms of foreign-exchange markets without attending to the political and economic main causes of foreign-exchange volatility, in particular monetary and fiscal policies. Fourth, it is not directly linked to the causes of environmental degradation, and its role in

addressing environmental problems would therefore not be clear. Finally, although technical questions of revenue raising and distribution have been studied by academic researchers to some extent, national Governments have not yet been involved.

C. Activities implemented jointly

89. At the first session of the Conference of the Parties held in Berlin in 1995, the Parties took the decision to undertake a pilot phase for activities implemented jointly (AIJ) under the United Nations Framework Convention on Climate Change. 7/ The decision states, inter alia, that such activities are neither considered as a fulfilment of the current commitments of annex I Parties 8/ under article 4.2.(a) of the Convention if a non-annex I is involved, nor do they in any way modify the commitments of each Party to the Convention. It was decided that no credits should accrue to any Party as a result of greenhouse gas reduced or sequestered during the pilot phase from AIJ.

90. By taking the decision to establish a pilot phase, the Parties identified the need to gain experience with the practical and conceptual implications of AIJ. They intend to keep this pilot phase under review and to decide before the end of the decade whether a progression beyond the pilot phase should take place.

D. Tradeable carbon dioxide permits

91. The role of pilot schemes as a key to further progress towards the launching of a system of internationally tradeable carbon dioxide permits was discussed at the third session of the Commission (see E/CN.17/1995/8). In the meantime, a preliminary development plan for a pilot global warming emissions trading programme has been prepared under the sponsorship of the Earth Council with the goal of implementing such a programme starting in 1999. The plan has received strong interest from numerous major industrial corporations, national Governments, environmental groups and international agencies.

92. Currently, a plan is being formulated to establish a private entity to implement and oversee the pilot trading programme. A core component of the market will be the Global Environment Trading System (GETS), a shareholder-owned business that will facilitate transactions in the market. The GETS entity is anticipated to be incorporated in a tax-advantaged locale, and will be initially capitalized with US$ 5.5 million.

IV. FINANCING THE TRANSFER OF ENVIRONMENTALLY SOUND TECHNOLOGIES

A. Specific problems

93. The Commission made substantial progress at its third session in identifying and analysing various mechanisms and instruments for the financing of environmentally sound technologies (ESTs), and it indicated that in its

future work it would focus on improving the conditions for financing from external financial resources, facilitating access to traditional national financing mechanisms, and promoting innovative mechanisms for the financing of ESTs (see E/CN.17/1995/8).

94. In addition, the Commission clarified that it intended to emphasize the development of concrete policies and measures in order to increase the policy impact of its work. It will therefore be necessary to analyse in greater depth the process of technology transfer; identify the types of recipients of technology transfer that require improved access to finance; clarify to what extent difficulties in financing environmental technologies differ from problems in financing other production inputs; and investigate to what extent the financial sector has the experience and skills required to judge the creditworthiness of investments in either pollution abatement or cleaner production technologies.

95. While substantial research on these and other related questions still needs to be undertaken, some indications are given below to stimulate the discussion at the present session of the Commission.

96. In discussing access to the financing of ESTs, it is important to differentiate between the requirements and problems of different types of firms, in particular firms that produce non-environmental products and plan to incorporate ESTs in their production process, and firms that manufacture and/or distribute environmental technologies. It is also important to emphasize that the total financial requirement is not only related to hardware, such as technology and physical equipment, but also to software, such as installation, training and servicing.

97. As mentioned above, it will be very important to clarify to what extent issues related to the financing of ESTs differ from other issues of access to finance for firms: the answer to this question is essential for focusing the discussion on the financing of ESTs and not getting lost in investigating general issues of access to finance. For example, when discussing the financing of ESTs for small enterprises, the relevant question is: to what extent do enterprises face additional problems of access to finance when investing in integrating ESTs in their production process? And do small environmental firms have greater problems in access to finance than non-environmental firms? Another relevant question is: to what extent do current national and international programmes for the promotion of small enterprises address these issues?

98. The access of environmental firms to venture capital is a good illustration of this point that provides some interesting insights into a major problem of technology finance. In view of incomplete access to other country examples, the case of the United States of America is explored below.

B. Venture capital and equity finance for environmental firms

99. Venture capital investing in environmental technology in the United States provides a good illustration of the problems of funding the development of

environmental technology. In 1991, the 64 venture capital firms active in the United States invested a total of US$ 140 million in environmental firms. By 1993, the number of venture capital firms had fallen to 36 and the amount invested to US$ 100 million. By 1995, there remained just over 12 venture capital firms, investing a total amount of less than US$ 35 million.

100. Environmental firms were never a favourite of venture capital firms: although between 1980 and 1992 over US$ 30 billion in venture capital was invested in United States firms, less than 2 per cent of that sum was placed in environmental and energy-related investments.

101. In the United States, the relative lack of interest of venture capitalists in environmental firms is attributable to various factors. For example, it is difficult to forecast the growth of the highly segmented ESTs market, partly because of unforeseeable developments in environmental regulation. In addition, the poor performance of stocks of environmental firms makes it difficult for new firms to go public and thus provide an exit vehicle for venture capitalists. In addition, environmental firms tend to strongly emphasize the technology aspects of their businesses and at times neglect the importance of good management.

102. The example of the United States with regard to access to venture capital shows that it is not the availability of capital that is the limiting factor: such limitations are rooted partly in problems that are inherent to the business of environmental firms and partly in the management failures of a young industry. Some economies in transition and many developing countries face the additional problems of an underdeveloped venture capital industry and inefficient equity markets.

V. MATRIX OF POLICY OPTIONS AND FINANCIAL INSTRUMENTS: DEVELOPING ITS FORMAT AND CONTENT

103. Given the broad scope of mechanisms and instruments that can be applied to providing funding for the implementation of Agenda 21, there is a need for an overview in the form of a matrix to facilitate the work of the Commission. A rudimentary matrix was submitted to the Commission at its third session (see E/CN.17/1995/8); it was considered to be very useful. Members of the Commission felt, however, that there was a need for further developing its format and content.

104. Many of the policy options and instruments discussed in the matrix (see table 4) are currently in operation in several developed countries, economies in transition and developing countries, with varying degrees of success. Others are still at an experimental stage and will provide lessons for further refinement and adjustment to local conditions.

105. The format of the matrix could be further refined to provide estimates of the magnitude of the incentive and financing effect that would result from applying each policy option and instrument to each sector.

Notes

1/ "Development cooperation 1995 report: efforts and policies of the members of the Development Assistance Committee" (OECD, 1996).

2/ See also General Assembly resolutions 50/91 and 50/92.

3/ See "DAC policy statement on development partnership in the global context" (OECD, 1995).

4/ See "Environmental funds in economies in transition" (OECD, 1995), p. 35.

5/ See "Environmental funds for sustainable development", proceedings of a seminar for interested members of the OECD/DAC Working Party on Development Assistance and Environment (Paris, April 1995).

6/ See David Felix, "Financial globalization versus free trade: the case for the Tobin tax", United Nations Conference on Trade and Development Discussion Paper, No. 108 (Geneva, November 1995).

7/ Decision 5/CP.1; see FCCC/CP/1995/7/Add.1, p. 19).

8/ Annex I of the Convention includes developed countries contained in annex II, as well as countries that are undergoing the process of transition to a market economy.

Table 1 - Total net resource flows to developing countries (Current $ billion)

	1986	1987	1988	1989	1990	1991	1992	1993	1994p	Per cent of total 1986	1989	1994
I. OFFICIAL DEVELOPMENT FINANCE (ODF)	**50.1**	**56.5**	**61.1**	**60.9**	**69.7**	**69.6**	**70.5**	**69.5**	**70.2**	**66.9**	**52.7**	**38.2**
1. Official development assistance (ODF)[a]	38.5	43.7	47.7	48.8	52.8	58.5	59.5	56.2	59.7	51.5	42.2	32.5
of which: Bilateral disburs.	29.8	33.8	36.6	36.4	39.3	42.3	42.0	39.6	41.3	39.9	31.5	22.5
Multilat. "	8.7	9.9	11.1	12.4	13.5	16.2	17.5	16.6	18.4	11.6	10.7	10.0
2. Other ODF	11.6	12.8	13.4	12.1	16.9	11.1	11.0	13.3	10.5	15.5	10.5	?
of which: Bilateral disburs.	3.8	6.2	7.0	5.3	6.7	4.4	7.4	6.4	6.8	5.7	4.6	3.7
Multilat. "	7.8	6.6	6.4	6.8	10.2	6.7	3 6	6.9	3.7	10.4	5.9	2.0
II. TOTAL EXPORT CREDITS	**-0.6**	**-1.6**	**-2.2**	**9.4**	**4.7**	**1.8**	**1.3**	**-0.9**	**3.2**	**-0.8**	**8.1**	**1.7**
of which: short-term	3.0	4.1	2.0	4.8	4.5	-0.8	0.5	-1.5	0.2	4.0	4.	0.1
III. PRIVATE FLOWS	**25.3**	**30.7**	**39.1**	**45.3**	**51.8**	**50.8**	**76.8**	**94.1**	**110.4**	**33.8**	**39.2**	**60.1**
1. Direct investment (DAC)	10.7	19.4	21.8	26.5	26.4	22.6	27.3	38.8	47.0	14.3	22.9	25.6
of which: to offshore centres	5.8	10.9	8.9	6.5	7.1	6.5	9.5	9.8	..	7.8	5.6	..
2. International bank lending[b]	7.0	7.0	7.8	10.5	15.0	11.0	31.0	9.0	21.0	9.4	9.1	11.4
of which: short term	-4.0	5.0	4.0	8.0	7.0	12.0	25.0	7.0	15.0	-5.3	6.9	..
3. Total bond lending	1.0	-1.0	1.6	2.2	0.9	6.5	11.1	36.6	32.7	1.3	1.9	17.8
4. Other private[c]	3.3	1.3	3.7	2.1	4.4	5.3	1.4	4.0	4.0	4.4	1.8	2.2
5. Grants by non-governmental organisations	3.3	4.0	4.2	4.0	5.1	5.4	6 1	5.7	5.7	4.4	3.5	3.1
TOTAL NET RESOURCE FLOWS (I+II+III)	**74.8**	**85.6**	**98.0**	**115.6**	**126.2**	**122.2**	**147.8**	**162.7**	**183.8**	**100.0**	**100.0**	**100.0**
Memorandum items:												
Total net credits from IMF	-2.0	-4.7	-3.9	-2.1	-2.2	1.0	-0.3	-0.7	-0.5			
Recorded asset transactions by LDCs, net	-12.0	-9.1	-20.5	-18.2	-22.8	47.4	6.7	-25.3	..			
Interest and dividends paid by LDCs, gross	-73.1	-75.2	-89.9	-91.7	-86.3	-82.3	-85.7	-81.3	-90.4			
Total official grants	25.4	28.0	31.8	32.9	39.7	45.6	44.9	42.7	45.0			
Total intra-LDC flows (ODA)[d]	4.1	3.3	2.2	1.7	6.0	2.6	1.0	1.2	1.2			
At 1993 prices and exchange rates												
Total net resource flows	110.5	109.4	116.3	138.5	135.3	126.7	144.4	162.7	176.4			
Total official development finance	74.0	72.2	72.6	73.0	74.7	72.2	68 9	69.5	67.4			
Total ODA receipts	56.9	55.8	56	58.5	56.6	60.7	58.1	55.2	57.3			
Total DAC ODA (bilateral and multilateral)	53.8	52.9	57.	56.1	58.2	60.1	60.8	56.5	56.7			

a) Excluding forgiveness of non-ODA debt for the years 1990 to 1992.
b) Excluding bond lending by banks (item III.3), and guaranteed financial credits (included in II).
c) No reporting has been received from DAC Members on portfolio equity investment.
d) Not included in total net resource flows.

Source: Development Co-operation 1995 Report, OECD 1996, Table III.1

Table 2 - Trends in the Volume and Allocation of Official Development Assistance

	$ million		Per cent of GNP		Per cent Change 1994/3	
	1993	1994	1993	1994	In dollars[a]	In real terms[b]
I. In 1994 four countries reached the 0.7 per cent of GNP UN target for ODA						
Norway	1 014	1 137	1.01	1 05	12.1	11 2
Denmark	340	1 446	1.03	1.03	7.9	2 2
Sweden	1 769	1 819	0 99	0 96	2 9	-0 9
Netherlands	2 525	2 517	0 82	0 76	0 3	-4 2
II. Six other countries reached 0.35 per cent						
France	7 915	8 466	0 63	0 64	7 0	3 4
Canada	2 373	2 250	0 45	0 43	-5 2	-0 2
Luxembourg	50	59	0 35	0 40	19 9	13 4
Switzerland	793	982	0 33	0 36	23 8	12 7
Australia	953	1 088	0 35	0 35	14 1	5 0
Portugal	248	308	0 29	0 35	24 5	22 9
III. Eleven countries were below 0 35 per cent						
Germany	6 954	6 818	0 36	0 34	-2 0	-6 0
Austria	544	655	0 30	0 33	20 4	14 8
Belgium	810	726	0 [illegible]	0 32	-10 4	-15 1
Finland	355	290	0 45	0 31	-18 3	-21 2
United Kingdom	2 920	3 197	0 31	0 31	9 5	5 2
Japan	11 259	13 239	0 27	0 29	17 6	7 9
Spain	1 304	1 305	0 28	0 28	0 1	0 9
Italy	3 043	2 705	0 31	0 27	-11 1	-11 7
Ireland	81	109	0 20	0 25	34 2	29 3
New Zealand	98	110	0 25	0 24	12 4	0 5
United States	10 123	9 927	0 16	0 15	-1 9	-4 0
Total DAC countries	**56 472**	**59 152**	**0.31**	**0.30**	**4.7**	**0.5**

a) At current prices and exchange rates.
b) At 1993 prices and exchange rates.

Source: Development Co-operation 1995 Report, OECD 1996, Table IV 1

Table 3 - Total disbursed debt of developing countries at year-end 1986-94 by source and terms of lending

Current $ billion

Long-term debt	1986	1987	1988	1989	1990	1991	1992	1993	1994
I. OECD COUNTRIES AND CAPITAL MARKETS	**615**	679	664	665	665	668	690	711	777
A. ODA	90	112	113	115	127	136	139	147	163
B. Total export credits	172	202	176	187	202	211	234	241	267
Official export credits	79	94	87	92	95	103	115	114	110
Guaranteed supplier credits	30	34	26	27	28	27	36	36	45
Guaranteed bank credits	63	74	63	68	79	81	83	91	112
C. Financial markets	353	365	375	363	326	321	317	323	347
Banks	310	318	325	307	267	256	244	218	223
Bonds	43	47	50	56	59	65	73	105	124
II. MULTILATERAL	**172**	211	203	209	236	253	257	270	295
of which: Concessional	48	58	61	66	75	84	90	97	110
Non-concessional	124	153	142	143	161	169	167	173	185
Memo: Total IMF	40	41	34	32	32	33	32	31	32
III. NON-OECD CREDITOR COUNTRIES	126	151	151	161	164	165	171	174	168
Sub-total: Long-term debts	**913**	**1041**	**1018**	**1035**	**1055**	**1086**	**1118**	**1155**	**1240**
of which: Concessional	200	242	266	278	300	322	334	350	379
Non-concessional	717	799	759	764	761	772	783	807	862
Short-term debt									
Banks	178	192	192	197	232	247	290	316	362
Export credits	38	44	47	50	67	74	68	62	68
Sub-total: Short-term debt	216	236	239	247	299	321	358	378	430
Other identified liabilities	20	20	27	23	27	28	34	37	4
Total external debt	**1149**	**1297**	**1284**	**1305**	**1381**	**1435**	**1510**	**1570**	**1714**

Source: Development Co-operation 1995 Report, OECD 1996, Table III.1

Table 4. Matrix of policy options and financial instruments

SECTORS	ECON & FINANCIAL REFORMS	PROPERTY RIGHTS	RENT CAPTURE/ RESOURCE PRICING	SUBSIDY REDUCTION	TAXATION	ENVIRON. CHARGES	INNOVATIVE DOMESTIC MECHANISMS	INNOVATIVE GLOBAL MECHANISMS
SUSTAINABLE DEVELOPMENT	competitive capital markets	secure property rights	full-cost pricing	reduce energy & capital subsidies	• green taxes • reduction of distortionary taxes	depletion of pollution charges	• ecolabelling • ecofunds • sustainable development equity funding	joint implementation
BIODIVERSITY	• enviro. funds • venture capital	biodiversity patents	prospecting fees	reduce land conversion subs	habitat protection subsidy	deforestation charge	• bioprospecting fees • ecotourism fees • scientific tourism fees	• patents • intellectual property rights • TCCs
FOREST RESOURCES	enviro. funds	• long-term concessions • bidding	forest product pricing	• below-cost timber sales • conversion sub	forest concession taxes	deforestation charge	• watershed chgs • tradable reforest credit	• tradable forest protection obligation • carbon offsets
FRAGILE ECOSYSTEMS	enviro. funds	communal property rights	pricing of ecological functions	removal of land conversion and agrochem. subs	differential land-use taxes	deforential land use charges	• relocation incentives • TDRs	TCCs
FRESH WATER RESOURCES	municipal bonds	water rights	• user charges • marginal cost pricing	subsidies to water cons. & irrigation	differential land-use taxes	sewage & effluent charges	tradable water shares	water trading across borders
LAND RESOURCES	capital market reforms	• no titles for land clearing • secure land ownership	public land pricing	• agricul. subsidy • below-cost public land sale/lease	• property taxes • land-use taxes • transfer taxes	• impact fees • waste disposal charges	• betterment chgs • differential land-use charges	• tradable development rights • debt swaps
SUSTAINABLE AGRICULTURE	removal of interest rate ceilings	secure land ownership	water pricing	• water subsidies • agrochem. subs	• agrochem. taxe • IPM subsidies	differential land-use charges	• differential land-use charge • ecolabelling	• int'l sustainability standards/price premia • carbon offsets
ATMOSPHERE	privatization of inefficient state enterprises	emission entitlements	energy pricing	energy subsidies	energy taxes	emission charges	tradable SO_2 emission permits	• tradable CO_2 permits • carbon offsets
OCEANS		200 mile EEZ fishing licenses	fishing input pricing	• agrochem. subs	Agrochem. taxes	effluent charges	individual tradable quotes	oil spill bonds
HAZARDOUS WASTE/TOXIC CHEMICALS	industrial environmental funds	manifest system	full-cost pricing of chem./toxic metals	removal of chem. input subs	• chem. feedstock taxes • diff. taxation • taxes on che	• presumptive charges • feedstock chgs	• environmental bonds • waste delivery incentives	ban of int'l trans. of hazardous waste
SOLID WASTE	municipal bonds	privatization of service	full-cost pricing of raw materials	removal of depletion allow. & subs. of raw mats	• property taxes • taxes on packaging mat (paper, plastic)	collection & disposal charges	• general deposit refund system • recycling incentive	tradable recycled content
URBAN ENVIRONMENT	• municipal bonds • IIOT	• TDRs • mad tolls • pollution permits	marginal-cost pricing of public utilities	• energy subsidies • water subsidies	• property taxes • relocation incentives for industry	pollution charges	• betterment chgs • TDRs • tradable emission permits, IIOC	• joint implementation of energy efficient projects

Table 4 (continued)

ABBREVIATIONS USED IN MATRIX

BOT:	Build-operate-transfer
IPM:	Integrated pest management
EEZs:	Exclusive economic zones
TCCs:	Tradeable conservation credits
TDQs:	Transferable development quotas
TDRs:	Transferable development rights
environ:	environmental
chem:	chemical
hvy:	heavy
subs.:	subsidies
agricul:	agriculture
agrochem:	agrochemical
allow.:	allowances
mats.:	materials
diff:	differential
chgs:	charges
reforest.:	reforestation
int'l:	international
trans.:	transport